

NOMENCLATURE OF FOREST HUMUS LAYERS

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THE nomenclature of forest humus layers is greatly in need of standardization. We find, for instance, in current American forestry literature such terms as raw humus, peat, upland peat, acid humus, torf, duff, and mor, all used for the type of humus layer where the organic matter is unincorporated in the soil proper. This type is commonly found in the East, the Lake States, the Rocky Mountains, and the Pacific Northwest. Many readers would get the impression that these various terms refer to different types whereas in most cases they all refer to the same main type of humus layer. Different names such as mild humus, leaf mold, neutral humus, or mull have also been applied to the other main type of humus layer which is characterized by the incorporation of the organic matter in the mineral soil. This type is also commonly found in the humid forest regions of United States.

The situation in Europe is equally confusing (9); several terms are used for the same type of humus layer and the same term applied to different types.

Hence it is desirable to establish a nomenclature of forest humus layers in order that foresters and soil scientists may use specific terms without having to define them every time they are used.

A humus nomenclature was presented by C. H. Bornebusch (1) at the Congress of the International Union of Forest Research Organizations held at Nancy, 1932. In its major features, this system was similar to the classification proposed by Romell and Heiberg (9). Both classifications are based upon the foundation laid down by P. E. Müller (7) in 1878. However, Bornebusch's system does not include all of the important types commonly found in United States. The writer therefore cooperated with Dr. Bornebusch and presented the following nomen-

clature of forest humus layers at the Third International Congress of Soil Science in Oxford, England, 1935. The sub-commission for forest soils of this congress accepted the proposed nomenclature with two reservations which, together with the original proposal, are given below. During the same meeting of the sub-commission for forest soils, Dr. M. F. Morgan presented a message from Dr. H. A. Lunt, who represented the forest soils committee of the American Soil Survey Association, requesting the sub-commission of the congress to take action regarding the nomenclature of forest humus layers.

The following is taken from the Transactions of the Third International Congress of Soil Science: "Proposal to the Third International Congress of Soil Science, Oxford, England, 1935, for the Nomenclature of Forest Humus Layers,"¹ by C. H. Bornebusch and S. O. Heiberg (2).

I. The definitions of the kinds of forest humus must, in accordance with P. E. Müller, be based on morphological characters which can be easily observed directly in nature.

II. Two main kinds, only, are to be recognized: "mull" and "mor."

III. *Mull*: mixture of organic matter and mineral soil, of crumbly or compact structure, with the transition to lower layers not sharp.

Three forms are recognized:

(a) *Coarse mull*:² Coarse grain structure, organic matter very conspicuously mixed with mineral soil (usually 5—20 per cent organic content; exceptional cases even considerably higher).

(b) *Fine mull*:³ Fine grain structure. Organic content high (usually over 50 per cent).

(c) *Firm mull*: Dense compact structure, usually low content of organic matter, often less than 5 per cent.

IV. *Mor*: Organic matter practically unmixed with mineral soil, usually more or less matted or compacted. Transition to mineral soil always distinct. Often composed of two layers named (after Hesselman⁴) (5) F-layer, i.e., fermentation layer resting on H-layer, i.e., humified layer.

The F-layer consists of more or less decomposed litter, still recognizable and with rather loose structure.

The H-layer consists principally of finely-divided organic matter mostly unrecognizable as to origin. Structure more or less dense.

Three kinds of mor are recognized:—

(a) *Granular mor*:⁵ H-layer pronounced and fine granular in structure; lower part somewhat compacted. In dry condition, very easily broken into fine powder when pressed by hand.

(b) *Greasy mor*:⁶ F-layer usually relatively little developed, often more or less fibrous. H-layer thick, compact, with a distinct greasy feel when wet, hard and brittle when dry.

(c) *Fibrous mor*:⁷ F-layer well developed. Both F and H layers fibrous but not compact. Many plant remains visible also in H-layer.

Resolution—That the sub-commission for forest soils approves in general the proposals for the nomenclature of forest humus layers submitted by C. H. Borne-

¹By forest humus layers is understood the top layer of the soil, owing its characteristic features largely to its content of organic matter. This part is often described as A₀ and/or A₁.

²At the Congress in Nancy of the International Union of Forest Research Organizations in 1932, the V Section adopted "true mull" for this form.

³V Section adopted "superficial mull" for this form.

⁴The following definitions for F and H layers are not exactly in accordance with Hesselman (5).

⁵As for footnote 1 above—H-layer described as "fine humus."

⁶As for footnote 1 above—H-layer described as "greasy humus."

⁷As for footnote 1 above—H-layer described as "fibrous humus."

busch and S. O. Heiberg, with the following reservations:

(1) That these terms generally apply to well-drained forested soils, and it may be desirable to use other terms (e.g., peat) for forest humus which is influenced by ground water.

(2) That the terms submitted are to be regarded as examples of typical kinds of humus already recognized. Other kinds may be added to cover, for instance, the forest floor in the warmer and drier forested regions.

(3) That, on the suggestion of the American Soil Survey Association, the sub-commission proposes to use the term "forest floor" to cover the whole of the organic material on the soil surface (including litter).

A few comments may be of value. Most essential is the recognition for international use of P. E. Müller's original terms mull and mor for the two main types of humus layer. Terms which would fit the English language better might have been adopted but mull and mor will probably cause the least confusion.

Only the more important sub-types are included, and descriptive terms which easily can be translated into any language have been used. More sub-types might have been included but in order to get international approval it was necessary to confine the sub-types to as few as possible and to give them as examples rather than as covering all types in existence.

Coarse mull corresponds to the true mull (7, 1), mull (5), and crumb mull (9).

Fine mull is equivalent to insect mull (7) and detritus mull (9). This highly productive type appears to be of little importance in Europe, but it is fairly common in eastern United States, and the author has also found it in the Douglas fir fog belt type.

Firm mull has been described, as far as I know, only in an unpublished manu-

script by P. E. Müller. It is, however, of great importance both in North America and Europe and probably occupies more area than both the coarse and the fine mull.

Hesselman's designations F and H for the two different strata of mor have received wide application but other terms have also been used. In the forest terminology compiled by a committee of the Society of American Foresters (3), it was suggested that "an intermediate layer of more or less decomposed organic matter below the litter may be designated as duff." However, the term duff is used by many foresters in a different sense so it seems better to use Hesselman's short designations for these two important and usually quite distinct parts of mor. The definitions given have the same meaning but not exactly the same wording as those given by Hesselman (5).

Granular mor is described by Heimburger (4) under the name of granule mor. Greasy mor and fibrous mor correspond to two types described by Juncker (6), the amorphous and fibrous type, and are equivalent to greasy and fibrous duff by Romell and Heiberg (9).

Classifications of this kind are not important only for specialists in forest soils but should be the property of every forester. The growth and reproduction of forest stands are greatly influenced by the type of forest humus layer. The growth is far better on a mull than on a mor. Certain species reproduce better on mor and others better on mull. A ground fire behaves essentially differently in a coarse mull than in a greasy mor, and the surface run-off is many times greater from a firm mull than from a coarse or fine mull. Cuttings and plantings are changing the character of the humus layer, depending upon the way the operation is done. It would therefore be of importance for the foresters as well as for the soil scientist to agree upon a clear classification of the humus layer of the forest.

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